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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/673,267	09/30/2003	Yona Perets	P-6064-US	2064

49444 7590 06/12/2007
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ART UNIT	**PAPER NUMBER**
2611	
MAIL DATE	**DELIVERY MODE**
06/12/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/673,267	PERETS ET AL.
	Examiner	Art Unit
	Siu M. Lee	2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 March 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 and 7-36* is/are rejected.

7)☒ Claim(s) *6* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-36 have been considered but are moot in view of the new ground(s) of rejection because of the amendment.

Claim Objections

2. Claims 6 and 27 is objected to because of the following informalities:

(1) Regarding claim 6:

Claim 6, line 3, the examiner suggests to change from “at least two of said two or more” to ---at least two of said---.

(2) Regarding claim 27:

The examiner suggests to change the second line of claim 27 from “the chosen mode of operation is the performance mode of operation the” to --- the chosen mode of operation is the power mode of operation the---.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-4, 6, 7, 10, 22, 24, 25, and 27-32 are rejected under 35 U.S.C. 102(e) as being anticipated by Fulghum et al. (US 6,580,930 B1).

(1) Regarding claim 1:

Fulghum et al. discloses an apparatus (receiver 200 in figure 2) comprising:

a multi-algorithm detector (the algorithm used by the less complex detector 210 and the algorithm used by the more complex detector 215 in figure 2) to detect a signal (signal store in predetection buffer 207 in figure 2) according to a detection algorithm selected from two or more detection algorithms (selection of the less complex detector 210 or more complex detector 215 by the signal detector selector 220 in figure 2), the detector having a controller (controller 235 in figure 2) to choose a mode of operation (the controller control the switch 240 to supply power to the selected detector) for the selection of the detection algorithm from at least a power mode of operation (using the less complex detector 210 in figure 2) (the less complex detector 210 uses less power, column 1, lines 23-33, column 10, lines 19-20, the examiner interpret the power mode of operation as the usage of the detector that uses less power as discloses in the instant application paragraph 0035 and paragraph 0051, "control unit 234 may be able to select between the two modes of operation according to an energy level of a power source, e.g., a battery, used to supply detector 200 with electric power." Since the less complex detector uses less power than the more complex detector, the examiner interpret the usage of the less complex detector as the power mode and satisfy the limitation) and a

performance mode of operation (usage of the more complex detector 215, which is more sophisticated and the power consumption is higher, column 1, lines 23-33) wherein the selection of the detection algorithm is based on a predetermined selection criterion (comparison of the bit error rate with the predetermined bit error rate threshold) associated with a chosen mode of operation (when using the less complex detector, comparing the bit error rate to the bit error rate threshold value and the compare the CRC code encoded in the signal, if the less complex detector produce a higher bit error rate or the CRC code does not check, then switch to the more complex detector) (column 4, lines 29-32 and 34-39, column 6, lines 22-31).

(2) Regarding claim 2:

Fulghum et al. discloses an apparatus wherein said detector comprises two or more sub-detectors (less complex detector 210 and more complex detector 215 in figure 2) to detect said signal (signal store in predetection buffer 207 in figure 2) according to said two or more detection algorithms (the algorithm used by the less complex detector and the algorithm used by the more complex detector detected symbols at locations corresponding to the known symbols with predetermined symbol values, column 4, lines 15-27), respectively.

(3) Regarding claim 3:

Fulghum et al. discloses an apparatus wherein said controller (controller 235 in figure 2) is to control the selection of said detection algorithm according to outputs of said sub-detectors (controller 235 controls switch 240 to supply power to either less

complex detector 210 or more complex detector 215 depending on the bit error rate, column 4, lines 37-39).

(4) Regarding claim 4:

Fulghum et al. discloses an apparatus wherein said controller is to control activation of one or more of said at two or more sub-detectors (controller 235 can control switch 240 to activate less complex detector 210 or more complex detector 215 depending on the bit error rate detected by the bit error detector 230 in figure 2, column 4, lines 37-39).

(5) Regarding claim 6 (the examiner interpret the claim as "sequentially activate at least two or more sub-detector according to a preset sequence"):

Fulghum et al. discloses an apparatus wherein if a power mode of operation (usage of the less complex detector 210 in figure 2) is selected, said controller is to activate only one of said two or more sub-detector or sequentially activate at least two or more sub-detectors according to a preset sequence (the controller 235 in figure 2 will always activate the less complex detector 210 in figure 2) (column 4, lines 27-39).

(6) Regarding claim 7:

Fulghum et al. discloses an apparatus wherein said controller comprises a calculator to calculate a quality metric (to determine the bit error rate for the known symbols) corresponding to one or more of said sub-detectors (bit error detector 230 in figure 2 determine the bit error rate (BER) for the known symbols in one or more field of the received signal) (column 4, lines 22-27).

(7) Regarding claim 10:

Fulghum et al. discloses an apparatus having a mode of operation wherein said criterion relates to a preset minimum quality value (comparing with the BER threshold value in block 270 in figure 2) (column 4, lines 29-33).

(8) Regarding claim 22:

Fulghum et al. discloses a method (figure 3) choosing a mode of operation for the selection of a signal-detection algorithm (the selection between the algorithm used by the less complex detector and the algorithm used by the more complex detector) from at least a power mode of operation (usage of the less complex detector 210 uses less power, column 1, lines 23-33, column 10, lines 19-20, the examiner interpret the power mode of operation as the usage of detector that uses less power as discloses in the instant application paragraph 0035 and paragraph 0051, "control unit 234 may be able to select between the two modes of operation according to an energy level of a power source, e.g., a battery, used to supply detector 200 with electric power." Since the less complex detector uses less power than the more complex detector, the examiner interpret the usage of the less complex detector as the power mode and satisfy the limitation) and a performance mode of operation (usage of the more complex detector 215, which is more sophisticated and the power consumption is higher, column 1, lines 23-33); and

selecting the signal-detection algorithm from two or more signal-detection algorithms (selection of algorithm used by the less complex detector 210 or the algorithm used by the more complex detector 215) wherein the selection of the detection algorithm is based on a predetermined criterion (comparison of bit error rate to

the predetermined bit error rate threshold) associated with a chosen mode of operation (when using the less complex detector , comparing the bit error rate to the bit error rate threshold value and the compare the CRC code encoded in the signal, if the less complex detector produce a higher bit error rate or the CRC code does not check, then switch to the more complex detector) (column 4, lines 29-32 and 34-39, column 6, lines 22-31).

(9) Regarding claim 24:

Fulghum et al. discloses a method (method discloses in the flowchart in figure 11A, 11B, and 11C) comprises:

calculating according to a predetermined sequence a first quality metric (bit error rate) corresponding to a first signal-detection algorithm (less complex detector 911 in figure 10) of said two or more signal-detection algorithm (there are N detectors in the detector unit in figure 10);

selecting the first signal-detection algorithm if the first quality metric has a value higher than a preset minimum-quality value (decision step 1012 in figure 11B determines whether the bit error rate (BER) is less than the threshold and decision step 1018 in figure 11B determines is the detection is effective; if yes, the less complex detector is used, column 10, lines 32-40),

calculating according to the predetermined sequence a second quality metric (bit error rate in using the more complex detector 915, column 10, lines 45-47) corresponding to a second signal-detection algorithm of said two or more signal-detection algorithm, if the first quality metric has a value lower than the preset minimum-

quality value (if the decision step 1012 in figure 11B decides that the bit error rate from the less complex detector 1012 is greater than the BER threshold, the control will pass to the step 1024 in figure 11A and turn on the power of the more complex detector and uses the more complex detector, column 10, lines 45-47); and

selecting the second signal-detection algorithm if the second quality metric has a value higher than the preset minimum-quality value (decision step in 1031 in figure 11B, when the BER of the more complex detector is less than the threshold BER, the more complex detector 915 is being used, column 10, lines 58-60).

(10) Regarding claim 25:

Fulghum et al. discloses an article comprising a computer storage medium having stored thereon instructions that (software embodiment running on one or more programmable controllers, column 13, lines 52-58, it is inherent that the software will be store in the programmable controller and running by a processor in the controller), when executed by a processing platform, result in:

choosing a mode of operation for the selection of a signal-detection algorithm (algorithm used by the less complex detector 210 or the algorithm used by the more complex detector) from at least a power mode of operation (the usage of the less complex detector, the less complex detector 210 uses less power, column 1, lines 23-33, column 10, lines 19-20, the examiner interpret the power mode of operation as the detecting algorithm that uses less power as discloses in the instant application paragraph 0035 and paragraph 0051, "control unit 234 may be able to select between the two modes of operation according to an energy level of a power source, e.g., a

battery, used to supply detector 200 with electric power." Since the less complex detector uses less power than the mode complex detector, the examiner interpret the usage of the less complex detector as the power mode and satisfy the limitation) and a performance mode of operation (the usage of the more complex detector 215, which is more sophisticated and the power consumption is higher, column 1, lines 23-33); and

selecting the signal-detection algorithm from two or more signal-detection algorithms (algorithm used by the less complex detector 210 or the algorithm used by the more complex detector), wherein the selection of the detection algorithm is based on a predetermined criterion (comparison of the bit error rate to the predetermined bit error rate threshold) associated with a chosen mode of operation (when using the less complex detector , comparing the bit error rate to the bit error rate threshold value and the compare the CRC code encoded in the signal, if the less complex detector produce a higher bit error rate or the CRC code does not check, then switch to the more complex detector) (column 4, lines 29-32 and 34-39, column 6, lines 22-31).

(11) Regarding claim 27 (the examiner interpret that the performance mode in line 2 is a mistake and it should be the power mode):

Fulghum et al. discloses programmable controller executing a software to perform the steps of:

calculating according to a predetermined sequence a first quality metric (bit error rate) corresponding to a first signal-detection algorithm (less complex detector 911 in figure 10) of said two or more signal-detection algorithm (there are N detectors in the detector unit in figure 10);

selecting the first signal-detection algorithm if the first quality metric has a value higher than a preset minimum-quality value (decision step 1012 in figure 11B determines whether the bit error rate (BER) is less than the threshold and decision step 1018 in figure 11B determines is the detection is effective; if yes, the less complex detector is used, column 10, lines 32-40),

calculating according to the predetermined sequence a second quality metric (bit error rate in using the more complex detector 915, column 10, lines 45-47) corresponding to a second signal-detection algorithm of said two or more signal-detection algorithm, if the first quality metric has a value lower than the preset minimum-quality value (if the decision step 1012 in figure 11B decides that the bit error rate from the less complex detector 1012 is greater than the BER threshold, the control will pass to the step 1024 in figure 11A and turn on the power of the more complex detector and uses the more complex detector, column 10, lines 45-47); and

selecting the second signal-detection algorithm if the second quality metric has a value higher than the preset minimum-quality value (decision step in 1031 in figure 11B, when the BER of the more complex detector is less than the threshold BER, the more complex detector 915 is being used, column 10, lines 58-60).

(12) Regarding claim 28:

Fulghum et al. discloses a communication system comprising:

a first communication device (the receiver is receiving information transmitted by the transmitting station, column 3, lines 43-46) to transmit a signal through a communication channel (traffic channel) (column 14, lines 44-51); and

a second communication device to receive said signal (column 14, lines 20), said second communication device comprising a multi-algorithm detector (less complex detector 210 and more complex detector 215 in figure 2) to detect a signal according to a detection algorithm selected from two or more detection algorithms (the algorithm used by the less complex detector 210 and the algorithm used by the more complex detector 215 in figure 2), the detector having a controller to choose a mode of operation for the selection of the detection algorithm (controller 235 in figure 2) to choose a mode of operation (the controller control the switch 240 to supply power to the selected detector) from at least a power mode of operation (usage of the less complex detector 210 in figure 2) (the less complex detector 210 uses less power, column 1, lines 23-33, column 10, lines 19-20, the examiner interpret the power mode of operation as the usage of the detecting algorithm that uses less power as discloses in the instant application paragraph 0035 and paragraph 0051, “control unit 234 may be able to select between the two modes of operation according to an energy level of a power source, e.g., a battery, used to supply detector 200 with electric power.” Since the less complex detector uses less power than the more complex detector, the examiner interpret the usage of the less complex detector as the power mode and satisfy the limitation) and a performance mode of operation (usage of the more complex detector 215, which is more sophisticated and the power consumption is higher, column 1, lines 23-33), wherein the selection of the detection algorithm is based on a predetermined selection criterion (comparison of the bit error rate to the predetermined bit error rate threshold) associated with a chosen mode of operation (when using the less complex detector ,

comparing the bit error rate to the bit error rate threshold value and the compare the CRC code encoded in the signal, if the less complex detector produce a higher bit error rate or the CRC code does not check, then switch to the more complex detector) (column 4, lines 29-32 and 34-39, column 6, lines 22-31).

(13) Regarding claim 29:

Fulghum et al. discloses a system wherein said detector comprises two or more sub-detectors (less complex detector 210 and more complex detector 215 in figure 2) to detect said signal according to said two or more detection algorithms (algorithm used by the less complex detector and algorithm used by the more complex detector, e.g., differential detector and an equalizer, column 13, lines 61-63), respectively.

(14) Regarding claim 30:

Fulghum et al. discloses a system wherein said controller (controller 235 in figure 2) is to control the selection of said detection algorithm according to outputs of said sub-detectors (controller 235 controls switch 240 to supply power to either less complex detector 210 or more complex detector 215 depending on the bit error rate of the output of the detectors, column 4, lines 37-39).

(15) Regarding claim 31:

Fulghum et al. discloses a system wherein said controller is to control activation of one or more of said two or more sub-detectors (controller 235 can control switch 240 to activate less complex detector 210 or more complex detector 215 depending on the bit error rate).

(16) Regarding claim 32:

Fulghum et al. discloses an apparatus wherein said controller comprises a calculator to calculate a quality metric (to determine the bit error rate for the known symbols) corresponding to one or more of said sub-detectors (bit error detector 230 in figure 2 determine the bit error rate (BER) for the known symbols in one or more field of the received signal) (column 4, lines 22-27).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 8 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fulghum et al. (US 6,580,930 B1) in view of Acker (US 4,335,361).

Fulghum et al. discloses all the subject matter except said quality metric comprises a quality metric selected from the group consisting of a signal to noise ratio, a log likelihood ratio, and a mean square error. Fulghum et al. discloses an apparatus wherein said quality metric comprises a quality metric of the bit error rate (BER) (column 4, lines 18-27) which is inversely proportion to the signal to noise ratio.

However, Acker discloses a calculation method between the bit error rate and the signal to noise ratio (column 3, lines 45-50 and 62-65 and column 4, lines 21-30).

It is desirable to use the SNR to represent the signal degradation because SNR is a clearer indicator for signal degradation (column 4, lines 37-39 and 45-48).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify the quality metric of the system of Fulghum et al. with the signal to noise ratio as taught by Acker simplify the system.

7. Claims 9, 11, 21, 23, 26 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fulghum et al. (US 6,580,930 B1) in view of Yang (US 6,763,074 B1).

(1) Regarding claim 9 and 34:

Fulghum et al. discloses all the subject matter except wherein said controller comprises a max-detector to detect a highest quality metric of two or more quality metrics corresponding to two or more of said sub-detectors, respectively.

However, Yang discloses a demodulation system with multiple operating modes comprising a controller (selector 112 in figure 17) comprises a max-detector to detect a highest quality metric of two or more quality metrics corresponding to two or more of said sub-detectors, respectively (selector 112 selects one of the detector based on the performance metrics, column 11, lines 31-34).

It is desirable to have the controller comprises a max-detector to detect a highest quality metric of two or more quality metrics corresponding to two or more of said sub-detectors, respectively because it enable the selector to chose the detector that can better handle a particular form of interference better (column 10, lines 57-59). Therefore, it would have bee obvious to one of ordinary skill in the art at the time of

invention to combine the teaching of Yang with the system of Fulghum et al. to improve the performance of the system.

(2) Regarding claim 11:

Fulghum et al. discloses all the subject matter as discuss in claim 1 except wherein the predetermined selection criterion associated with the performance mode of operation related to a highest quality metric of two or more quality metrics corresponding to said detection algorithm.

However, Yang discloses a demodulation system with multiple operating modes comprising a multi-algorithm detector (detector 102(1) to detector 102(n) in figure 17, column 10, lines 57-65) to detect a transmitted signal according to a detection algorithm selected from two or more detection algorithms based on a predetermined selection criterion (column 10, line 65-column 11, line 15) and having a mode of operation, wherein said criterion relates to a highest quality metric of two or more quality metrics corresponding to said detection algorithms (column 11, lines 31-34).

It is desirable to have the predetermined selection criterion associated with the performance mode of operation related to a highest quality metric of two or more quality metrics corresponding to said detection algorithm because it enable the selector to choose the detector that can better handle a particular form of interference better in a shorter time (column 10, lines 57-59). Therefore, it would have bee obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Yang with the system of Fulghum et al. to improve the performance of the system.

(3) Regarding claim 21:

Fulghum et al., discloses all the subject matter as discussed above except wherein the predetermined selection criterion associated with the performance mode of operation relates to a highest quality metric of two or more quality metrics corresponding to said detection algorithms.

However, Yang discloses a demodulation system having a mode of operation, wherein the predetermined selection criterion relates to a highest quality metric of two or more quality metrics corresponding to said detection algorithms (column 11, lines 31-40).

It is desirable for the device to have a mode of operation, wherein said criterion relates to a highest quality metric of two or more quality metrics corresponding to said detection algorithms because it enable the selector to choose the detector that can better handle a particular form of interference better in a shorter time (column 10, lines 57-59). Therefore, it would have bee obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Yang with the system of Fulghum et al. to improve the performance of the system.

(4) Regarding claim 23 and 26:

Fulghum et al. discloses all the subject matter as disclose in claims 22 and 25 except calculating two or more quality metrics corresponding to said two or more signal-detection algorithm, respectively; and selecting from the two or more signal-detection algorithm a signal-detection algorithm corresponding to a highest quality metric of said calculated metrics.

However, Yang discloses a demodulation system with multiple operating modes comprising selecting a signal-detection algorithm from two or more signal-detection algorithms according to a predetermined criterion (column 11, lines 31-34) and calculating two or more quality metrics corresponding to said two or more signal-detection algorithms, respectively (signal quality estimator 108(1) to 108(n), column 10,lines 65-67); and selecting from the two or more signal-detection algorithms a signal-detection algorithm corresponding to a highest quality metric of said calculated metrics (column 11, lines 31-34).

It is desirable to calculating two or more quality metrics corresponding to said two or more signal-detection algorithm, respectively; and selecting from the two or more signal-detection algorithm a signal-detection algorithm corresponding to a highest quality metric of said calculated metrics because it enable the selector to choose the detector that can better handle a particular form of interference better in a shorter time (column 10, lines 57-59). Therefore, it would have bee obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Yang with the system of Fulghum et al. to improve the performance of the system.

8. Claims 12 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fulghum et al. (US 6,580,930 B1) in view of Wong-Lam et al. (US 5,487,085).

Regarding claims 12 and 35, Fulghum et al. discloses all the subject matter and that the more complex detector can be an equalizer (column 13, lines 62-63) except

Fulghum et al. does not explicitly discloses one or more of said detection algorithms comprises a minimum mean square error algorithm.

However, Wong-Lam et al. discloses a minimum mean square error block equalizer that detects the data (paragraph 0052, lines 4-7).

It is desirable to use a minimum mean square error algorithm in an equalizer because the computing algorithm on which they are based can be carried out very quickly (paragraph 0052, lines 9-11). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Wong-Lam et al. in the system and method of Fulghum et al. to improve the speed of the system.

9. Claims 13 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fulghum et al. (US 6,580,930 B1) in view of Zak et al. (US 6,084,926).

Regarding claim 13 and 36, Fulghum et al. discloses all the subject matter and that the more complex detector can be an equalizer (column 13, lines 62-63) except Fulghum et al. does not explicitly discloses one or more of said detection algorithms comprises a maximal likelihood sequence estimation algorithm.

However, Zak et al. discloses a method and system for demodulating radio signals that comprises a maximum likelihood sequence estimator (maximum likelihood sequence estimator 26 in figure 1, column 3, lines 12-18).

It is desirable to use a maximal likelihood sequence estimation algorithm in an equalizer because it is optimized for demodulating time-dispersive radio signals. Therefore, it would have been obvious to one of ordinary skill in the art at the time of

invention to employ the teaching of Zak et al. in the method and system of Fulghum et al. to improve the efficiency of the system.

10. Claims 14-17, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fulghum et al. (US 6,580,930 B1) in view of Pringle et al. (US 7,082,172 B1).

(1) Regarding claim 14:

Fulghum et al. discloses a wireless communications device comprising:

a multi-algorithm detector (less complex detector 210, more complex detector 215, bit error detector 230 and controller 235 in figure 2) to detect a signal (signal store in predetection buffer 207 in figure 2) according to a detection algorithm selected from two or more detection algorithms (less complex detector and more complex detector), the detector having a controller (controller 235 in figure 2) to choose a mode of operation (the controller control the switch 240 to supply power to the selected detector) for the selection of the detection algorithm from at least a power mode of operation (less complex detector 210 in figure 2) (the less complex detector 210 uses less power, column 1, lines 23-33, column 10, lines 19-20, the examiner interpret the power mode of operation as the detecting algorithm that uses less power as discloses in the instant application paragraph 0035 and paragraph 0051, "control unit 234 may be able to select between the two modes of operation according to an energy level of a power source, e.g., a battery, used to supply detector 200 with electric power." Since the less complex detector uses less power than the mode complex detector, the examiner interpret the less complex detector as the power mode and satisfy the limitation) and a performance

mode of operation (more complex detector 215 is more sophisticated and the power consumption is higher, column 1, lines 23-33), wherein the selection of the detection algorithm is based on a predetermined selection criterion associated with a chosen mode of operation (when using the less complex detector, comparing the bit error rate to the bit error rate threshold value and the compare the CRC code encoded in the signal, if the less complex detector produce a higher bit error rate or the CRC code does not check, then switch to the more complex detector) (column 4, lines 29-32 and 34-39, column 6, lines 22-31).

Fulghum et al. fails to disclose a wireless communication device comprising two or more antenna to receive a signal.

However, Pringle et al. disclose a wireless communication device comprising two or more antenna to receive a signal (receiver in figure 1 comprises antenna array 101 and receiver 102 to receive a transmitted signal, column 4, lines 34-44).

It is desirable for a wireless communication device comprising two or more antenna to receive a signal because with the improved reception ability of multiple antenna system, it can receive signal with lower signal-to-noise ratio. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Pringle et al. in the system of Fulghum et al. to improve the performance of the wireless communication device.

(2) Regarding claim 15:

Fulghum et al. further discloses a device wherein said detector comprises two or more sub-detectors (less complex detector 210 and more complex detector 215 in

figure 2) to detect said signal according to said two or more detection algorithms (the less complex detector and more complex detector detected symbols at locations corresponding to the known symbols with predetermined symbol values, column 4, lines 15-27), respectively.

(3) Regarding claim 16:

Fulghum et al. further discloses a device wherein said controller (controller 235 in figure 2) is to control the selection of said detection algorithm according to outputs of said sub-detectors (controller 235 controls switch 240 to supply power to either less complex detector 210 or more complex detector 215 depending on the bit error rate of the output of the two detectors, column 4, lines 37-39).

(4) Regarding claim 17:

Fulghum et al. further discloses an apparatus wherein said controller comprises a calculator (bit error detector 230 in figure 2) to calculate a quality metric (to determine the bit error rate for the known symbols) corresponding to one or more of said sub-detectors (bit error detector 230 in figure 2 determine the bit error rate (BER) for the known symbols in one or more field of the received signal) (column 4, lines 22-27).

(5) Regarding claim 20:

Fulghum et al. further discloses the device wherein the predetermined selection criterion associated with the power mode of operation relates to a preset minimum quality value (comparing with the BER threshold value (minimum quality) in block 270 in figure 2) (column 4, lines 29-33).

11. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fulghum et al. (US 6,580,930 B1) in view of Pringle et al. (US 7,082,172 B1) as applied to claim 17 above, and further in view of Acker (US 4,335,361).

Fulghum et al. and Pringle et al. disclose all the subject matter except said quality metric comprises a quality metric selected from the group consisting of a signal to noise ratio, a log likelihood ratio, and a mean square error.

Fulghum et al. discloses an apparatus wherein said quality metric comprises a quality metric of the bit error rate (BER) (column 4, lines 18-27) which is inversely proportion to the signal to noise ratio.

However, Acker discloses a calculation method between the bit error rate and the signal to noise ratio (column 3, lines 45-50 and 62-65 and column 4, lines 21-30).

It is desirable to use the SNR to represent the signal degradation because SNR is a clearer indicator for signal degradation (column 4, lines 37-39 and 45-48). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify the quality metric of the system of Fulghum et al. and Pringle et al. with the signal to noise ratio as taught by Acker simplify the system.

12. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fulghum et al. (US 6,580,930 B1) in view of Pringle et al. (US 7,082,172 B1) as applied to claim 17 above, and further in view of Yang (US 6,763,074 B1).

Fulghum et al. and Pringle et al. disclose all the subject matter except wherein said controller comprises a max-detector to detect a highest quality metric of two or more quality metrics corresponding to two or more of said sub-detectors, respectively.

However, Yang discloses a demodulation system with multiple operating modes comprising a controller (selector 112 in figure 17) comprises a max-detector to detect a highest quality metric of two or more quality metrics corresponding to two or more of said sub-detectors, respectively (selector 112 selects one of the detector based on the performance metrics, column 11, lines 31-34).

It is desirable to have the controller comprises a max-detector to detect a highest quality metric of two or more quality metrics corresponding to two or more of said sub-detectors, respectively because it enable the selector to chose the detector that can better handle a particular form of interference better in a shorter time (column 10, lines 57-59). Therefore, it would have bee obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Yang with the system of Fulghum et al. and Pringle et al. to improve the performance of the system.

Allowable Subject Matter

13. Claim 5 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

14. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Siu M. Lee whose telephone number is (571) 270-1083. The examiner can normally be reached on Mon-Fri, 7:30-4:00 with every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Siu M Lee
Examiner
Art Unit 2611
5/30/2007

CHIEH M. FAN
SUPERVISORY PATENT EXAMINER